Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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| In the Matter of | ) | |
| | ) | |
| Amendment of Parts 73 and 90 | ) | RM-9719 |
| of the Commission's Rules | ) | |
| to Authorize the Transmission | ) | |
| of Emergency Signals on Channel 200 | ) | |
| | ) | |

To: The Commission

## Comments of the Society of Broadcast Engineers, Inc.

The Society of Broadcast Engineers, Incorporated (SBE), the national association of broadcast engineers and technical communications professionals, with more than 5,500 members in the United States, hereby respectfully submits its comments in the above-captioned Petition for Rulemaking filed by Federal Signal Corporation proposing to create an Emergency Radio Data Service ("ERDS") operating on FM Channel 200 (87.9 MHz).

## I. SBE Opposes the Federal Signal Petition

1. SBE opposes the proposed creation of an Emergency Radio Data Service for several reasons. First, SBE is not convinced that an ERDS system would have the benefits touted by Federal Signal Corporation ("Federal Signal"). Although the Petition claim that ERDS is (present tense) a "highly-effective" low-power system for disseminating timely localized information to motorists, SBE questions how Federal Signal can make this claim, because the ERDS system presently does not exist.[1] Further, Federal Signal's claim that "ERDS could save thousands of lives and billions of dollars in unnecessary health costs and property losses" is un-substantiated.

2. However, SBE's primary reason for opposing the creation of ERDS is based on both operational and technical concerns, especially regarding interference to TV Channel 6

[1] Although the Petition indicates that Federal Signal holds an experimental license, WA2XNX, permitting operation on 87.9 MHz, a review of the FCC engineering database reveals that this experimental license authorizes operation within 161 kilometers of 30° 38' 51" N, 96° 16' 42" N. SBE notes that these coordinates are centered near the small communities of College Station and Bryan, Texas, as shown by the attached Figure 1, and questions whether experimental operations in rural communities constitute a realistic test. While Figure 1 shows that the 161-kilometer area of operation includes one large city, Houston, nothing in the Petition indicates that any tests were actually conducted in the Houston metro area.

stations, of which there are approximately 64 nation-wide. There are also approximately 171 TV Translator/Low Power Television ("LPTV") stations authorized for Channel 6 operation, and three Channel 6 digital television ("DTV") allotments. Use of Channel 200 by ERDS also poses an interference risk to (and from) Noncommercial Educational FM ("NCEFM") stations operating on FM Channels 201, and possibly stations operating on Channel s202 and 203, and to commercial FM stations operating on Channels 253 (98.5 MHz) and 254 (98.7 MHz).[2]

## II. Self-Interference Threat

3. Federal Signal's Petition includes letters in support of ERDS from no fewer than ten police agencies, two governmental disaster services agencies, and one ambulance service. While these entities all indicate that they support the concept of ERDS, it also raises the very real possibility of multiple police, fire, and special emergency agencies all trying to use 87.9 MHz simultaneously. The Petition is silent on how ERDS would ensure coordination between local police and fire agencies, county police and fire agencies, state police and fire agencies (*e.g.*, in California, the California Department of Forestry), and hundreds of private and governmental ambulance/paramedic vehicles, all of which could be operating in the same area. Ironically, the Petition includes a supporting letter from Delco Electronics Corporation (a major manufacturer of car radios), which refers to the National Oceanic and Atmospheric Administration's ("NOAA") 162 MHz warning system. But the NOAA "weather radio" system works because there are a carefully-controlled number of transmitters operating on seven VHF frequencies.[3] If the NOAA system tried to employ scores, and perhaps hundreds, of transmitters in the same general area, and further if all of those transmitters tried to operate on a single frequency, the efficient NOAA weather advisory system would become useless. But scores, and perhaps hundreds, of ERDS transmitters in a given area appear to be exactly what the Federal Signal petition would allow to occur. Even with a 1-watt effective radiated power ("ERP") limit, SBE submits that this would be a recipe for chaos.

4. Even if self-interference between *bona fide* ERDS transmitters could somehow be avoided, a single-frequency ERDS system would be vulnerable to jamming or "spoofing" by anyone with a little RF knowledge and access to an FM transmitter. Although Page 5 of Exhibit E ("Technical Report Re; (sic) Description and Analysis of the Federal Signal -

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[2] These are the IF taboo channels to Channel 200.

[3] 162.400, 162.425, 162.450, 162.475, 162.500, 162.525, and 162.550 MHz.

ERDS System") to the Petition indicates that the ERDS transmitter will also generate a 57 kHz Radio Data System ("RDS") subcarrier to "identify the message as a true ERDS emergency message, [and] not a spurious signal from nearby transmitters or intermodulation products," this still does not ensure immunity to spoofing or jamming of a vulnerable, single-frequency system. Further, SBE is puzzled about the Petition's claim, at Page 4 of Exhibit E, that "stereo transmission would not be used since it degrades audio performance under weak signal conditions," but yet ERDS receivers are somehow supposed to be able to decode a 57 kHz RDS subcarrier, presumably at an injection level of 10% or less. These appear to be contradictory claims.

## III. Annoyance Factor Problems

5. SBE anticipates that one problem with the proposed ERDS would be inadvertently left on transmitters. While it is obvious if a public safety vehicle has its lights or sirens on, large numbers of public safety vehicles, each equipped with an ERDS transmitter, could easily make inadvertently left on transmitters a chronic problem.

6. Yet another problem with the proposed ERDS is that warnings transmitted on the single available frequency of 87.9 MHz would also be received by vehicles not at risk for the warning in question. For example, one of the applications cited in the Petition are ERDS transmitters at the entranceways to bridges that are subject to icing. But an ERDS transmitter sending a warning to cars entering the possibly icy bridge would also be heard by cars leaving the bridge and by cars driving on nearby surface streets, not at risk of icing.

7. And what about motorists stuck in traffic, forced to listen over and over to an ERDS transmission, and possibly competing ERDS transmissions, one from a police vehicle responding to the problem, another from a fire truck responding to the problem, and a third from an ambulance responding to the problem, each of which arrogantly forces the motorist's radio to listen to the supposedly more urgent ERDS transmission rather than a regular AM or FM signal. SBE could even envision incidents of "road rage" directed at a motorist’s own ERDS-equipped radio that won't shut up.

8. Finally, there is the "startle factor" threat. Many motorists like to turn off their radio in difficult driving conditions, such as poor visibility or looking for a street number, at night, with impatient drivers tail-gating their resulting slow-moving vehicle, so they can fully concentrate on a difficult driving situation, without distraction. Under such conditions the sudden,

unexpected, and most likely undesired "un-squelching" of an ERDS-equipped radio could be a startle factor safety problem, worsening rather than enhancing road safety.

## IV. Interference from Channel 201 NCEFM Stations to ERDS Receivers

9. A single-frequency ERDS system would also be vulnerable to interference from a nearby TV Channel 6 transmitter or from an FM Channel 201 transmitter (and the FCC engineering database shows there are approximately 146 NCEFM stations authorized to operate on Channel 201, and an even greater number of FM Translators authorized for Channel 201). Although Exhibit E addresses the issue of Channel 201 interference into ERDS receivers, and concludes that such interference will only occur if the Channel 201 FM station is 100 times stronger than the ERDS station, SBE does not see this as ensuring that Channel 201 FM stations would not cause interference to Channel 200 ERDS radios. This is because 1) NCEFM stations can be authorized with ERPs of up to 100 kW, or 100,000 times greater (50 dB stronger) than an ERDS transmitter; 2) even if a more modest power Channel 201 NCEFM station is present, that station's ERP will likely be 1,000 to 10,000 times greater (30 to 40 dB stronger) than the ERDS station, and will always be at least 100 times greater (20 dB stronger), as the minimum licensable ERP for a NCEFM station is 100 watts. Given these power level disparities, the Exhibit E assumption that a D/U interference criteria of -20 dB will ensure no NCEFM-into-ERDS interference does not sound very convincing. When compounded with the likelihood that cars with ERDS-equipped radios would drive close to a Channel 201 transmitter site, SBE believes that Channel 201 NCEFM-into-ERDS interference would likely be a significant problem in markets with a Channel 201 NCEFM station.

## V. Hardware Issues

10. The Petition indicates that new vehicles would be equipped with new ERDS receivers that would always monitor 87.9 MHz, in addition to receiving conventional AM and FM broadcast channels. Upon detection of an 87.9 MHz signal, an ERDS-capable receiver would turn itself on, to a pre-set volume level, or if already on would interrupt the existing audio (be it from an AM radio station, an FM radio station, or audio source such as compact disk ("CD") or audio cassette), and substitute the incoming emergency message. SBE has several concerns about this concept, as follows: 1) automatically turning on a car radio could result in a drained battery and a dead vehicle; 2) automatically turning on a car radio in a parked car with a vehicle alarm system could trigger the alarm system; 3) many vehicles have

motor-driven antennas that only rise from inside the vehicle when the radio is turned on;[4] cars with such antenna designs would either not work with ERDS, or would require a second, in-the-windshield (and therefore always available) antenna; 4) many drivers might prefer to take their chances and forego the supposed "life saving" benefits of an intrusive ERDS signal, especially if such signals become so commonplace as a result of being overused by governmental and quasi-governmental agencies, and by "railroad locomotives, road construction sites, [and] traveler information systems" and on "school buses to warn motorists when the door is open and children are loading and unloading."

## VI. TV Channel 6 Interference

11. The primary reason for SBE's opposition is the interference that hundreds, or thousands, of ERDS transmitters would cause to TV Channel 6 reception. First, the Figure 2 to Exhibit E, which purports to establish the desired-to-undesired ("D/U") signal ratio that a typical television receiver tuned to Channel 6 could withstand from an ERDS signal on Channel 200, covers a totally inappropriate range of input levels. Figure 2 shows data covering television receiver inputs ranging from approximately -30 dBm to approximately +35 dBm, or from approximately +19 dBmV to a truly absurd +84 dBmV. A +84 dBmV signal represents 3.16 watts of power and would most likely instantly destroy the front ends of most consumer grade television receivers. Typical consumer grade television receivers will give usable reception from about 100 µVolts (-20 dBmV) to around 10,000 µVolts (+20 dBmV), with the most desirable signal levels being in the 1,000 to 5,000 µVolt range (0 to +14 dBmV). Above input levels of +20 dBmV many consumer television receivers will experience degraded performance due to overload, and at the totally ridiculous +84 dBmV input level shown by the black square box symbol for "Set #3 video" the receiver front end would most likely be destroyed.

12. For purposes of these comments, however, SBE will assume that the units for the X-axis of Figure 2 are actually "dBmV" rather than "dBm" (0 dBm = +49 dBmV), in which case the tested input range would be reasonable. Figure 2 can then be interpreted to show that in strong Channel 6 signal areas (*i.e.*, Channel 6 antenna input signal levels of +20 to +35 dBmV), the D/U ratio from a Channel 200 ERDS signal would have to be +4 dB or worse for interference to Channel 6 reception to occur (corresponding to the "Set #1 Audio" open square symbol), and for a weak Channel 6 signal area (*i.e.*, Channel 6 input signal levels of

[4] This situation will likely continue to increase, because car manufacturers want the whip antenna down with the radio off, to reduce cabin noise.

-30 dBmV (32 μVolts) to -20 dBmV (100 μVolts)) the D/U ratio can be as high as -10 dB before interference to Channel 6 reception would occur (that is, the undesired, or interfering, ERDS signal can supposedly be up to 10 dB stronger than the Channel 6 desired signal). However, SBE notes that these claimed D/U ratios are inconsistent with the D/U ratios shown in Figure 1 of Section 73.599 of the FCC Rules, reproduced here as Figure 2 to these comments. Although the Section 73.599 FCC Figure 1 only shows D/U ratios for FM channels 213 through 201, the Channel 200 D/U requirement can be estimated as indicated, using the best-case assumption of a linear extrapolation (and this may be far too optimistic, since, unlike Channels 201 through 213, Channel 200 is within the Channel 6 passband; however, for purposes of these comments, a most-favorable to ERDS linear extrapolation will be assumed).

13. One can then conclude that at the Grade B (47 dBu) contour of a Channel 6 TV station, a D/U ratio of +3.5 dB is required to avoid interference, with this ratio relaxing to approximately -8 dB for a very strong Channel 6 field strength of 90 dBu (*i.e.*, 16 dB above the 74 dBu City Grade contour for Channel 6 stations). SBE notes that the Federal Signal petition's claimed D/U ratio for no interference to Channel 6 television receivers is therefore 13.5 dB more lenient than the Section 73.599 FCC Figure 1 could be deduced to show. SBE therefore does not find the Federal Signal petition credible in its claim of no interference to Channel 6 reception, and concludes that shortcoming, by itself, should be treated as a fatal flaw to the Petition.

14. Yet another flaw in the Exhibit E treatment of Channel 6 interference is the assumption that the Channel 6 TV station is transmitting with an aural-visual power ratio of -7 dB (*i.e.*, 20% aural power). In reality, most TV stations transmit with aural-visual power ratios of only -10 dB (*i.e.*, 10% aural power), and many TV transmitters are not even capable of operating at more than 10% aural power. Therefore, Federal Signal's presumption of Channel 6 aural ERPs 3 dB higher than commonly used is again a fatal flaw to its Petition.

## VII. FM Channel 201 Interference Issues

15. SBE also has a concern about Exhibit E's treatment of ERDS into FM Channel 201 interference. Figure 1B to the Petition's Exhibit E shows that when the undesired ERDS signal is 11 dB or greater than that of the desired Channel 201 FM signal (*i.e.*, a D/U ratio of -11 dB or worse), interference to the Channel 201 FM signal can occur. If we assume that Channel 201 NCEFM signals are only entitled to protection to their 60 dBu contour, then the ERDS interfering contour becomes the 71 dBu contour. So the question becomes how far will

the 71 dBu contour of a 1-watt ERP ERDS signal go? If we assume an effective height of zero meters and use the F(50,10) curves, the answer is 1.98 kilometers. Especially for fixed ERDS transmitters at "railroad grade crossings," "traffic signs," "stationary construction [areas]," "[highway] maintenance [areas]," "overpasses," and "utility poles," or for itinerant fixed uses such as "highway construction areas," an interference zone of two kilometers is totally unacceptable.

16. Of course, one possible solution is to not allow the used of ERDS transmitters in TV Channel 6 or FM Channel 201 reception areas. But this then creates the obligation for the Commission to check ERDS applications for the presence of TV Channel 6, or FM Channel 201 service (including service from TV translators and FM translators). Even if the Commission was willing to set up such a cumbersome system, how would it ensure that mobile ERDS transmitters are not operated in such areas? SBE takes no solace from Federal Signal's argument that interference from mobile ERDS transmitters would be transitory in nature, as emergency vehicles could easily be stopped or parked for minutes or even hours at a site (for example, traffic control at a rock concert or sports stadium), all the while causing interference to TV Channel 6 reception or interference to FM Channel 201 reception.

## VIII. EAS Impact

17. The SBE EAS Committee works closely with the FCC's Emergency Alert System (“EAS”) National Advisory Committee and many state and local EAS emergency committees (State Emergency Communications Committees (“SECCs”) and Local Emergency Communications Committees (“LECCs”)). Some lessons pertinent to the ERDS issue learned through this close working relationship are enumerated below:

> 17a. The entity in charge of local emergency management for civil emergency warnings must be responsible for coordinating all information directed for public action. ERDS raises the real danger of uncoordinated or conflicting information release. Imagine a fire department and a police department both looking at an emergency, both with direct ERDS access to the public. The fire department could announce on ERDS an evacuation warning without making sure that police are around to handle the traffic jams. While these things have happened in the past, ERDS could well multiply any negative impact.

17b. ERDS also raises the risk of overlapping signals from adjacent jurisdictions. This would only add to public confusion. The phenomenon of FM capture is well documented.

17c. The ERDS would could add great additional complexity to local Emergency Alert System ("EAS") Management within the broadcast industry. If ERDS were to be created and exempt from EAS and its associated equipment, monitoring, and testing requirements, it would introduce an unneeded wild card in the emergency public information deck.

17d. LECC and SECCs have already been burdened by the additional workload of cable television EAS. EAS is still largely a volunteer effort. More work load on volunteers will lessen the incentive for broadcast station employees to want to volunteer.

17e. EAS LECCs are already attempting to address the challenge of turning public safety and emergency management entities into suppliers of effective broadcast EAS warnings. ERDS as envisioned is radio broadcasting. The lack of ERDS coordination with EAS ensures it would die a slow, ugly, expensive and embarassing death if the Commission were to mistakenly proceed to an NPRM and ultimately the creation of ERDS.

17f. Finally, SBE wishes to point out that the Federal Signal petition contained not one letter of support from any party insofar as the proposal's EAS impact. SBE believes that fact sends a powerful warning message, one that it trusts the Commission will heed.

## IX. Huge Universe of Non-ERDS Receivers

18. Yet another problem is that there would continue to be millions on non-ERDS radios used by the public for years to come. Although SBE is gratified that Delco is apparently willing to do its best to sell new and replacement receivers for every vehicle in America, until that happens Petitioner's claims of saving "thousands of lives" and "billions of dollars" are questionable, at best.

19. For years, SBE had heard manufacturers complain about the higher cost of adding even one resistor to a mass-produced radio. Now Petitioner (and apparently Delco radio) take the position that adding either a second front-end, or a frequency-hopping front end that

repeatedly momentarily checks for a signal on 87.9 MHz (and presumably without causing audible switching transients), is now suddenly not a problem. This seems unlikely.

## X. Other Receiver-based Solutions Would Make More Sense

20. If car radios are to have a second tuner, and a dedicated, always-available, antenna, then there is no longer any reason to confine the ERDS frequency to the FM broadcast band. Instead, a two-tuner ERDS receiver could monitor a public safety band frequency (or frequencies), allocated for motorist-alerting purposes. A group of nine "motorist alerting" frequencies, corresponding to the nine display options proposed in the Petition[5], might have a chance or working, as this would drastically lessen the coordination requirements inherent in multiple public safety entities all trying to use 87.9 MHz, and would, of course, completely eliminate the TV Channel 6 and FM Channel 201 interference problems.

21. Alternatively, car radio manufacturers could more effectively invest their receiver upgrade money by equipping car radios with an “E-chip.” As described in SBE’s April 20, 1998, comments to the FO Docket 91-171 Further Notice of Proposed Rulemaking concerning the Emergency Alert System,

> The FCC should set a date after which all television receivers or set top cable boxes sold in the United States or its territories be equipped with EAS decoding capability; in effect, an "E-chip." The FCC should further specify that this decoding capability must include the ability for the consumer to program into the receiver or set top cable box a channel designated by the consumer to be monitored for EAS information as well as the location of the unit for the purposes of EAS header code comparing. This allows the consumer to pick either a broadcast channel or the specific emergency channel designated by the cable system. It will also filter out alerts not pertinent to the viewer's location.

SBE believes that an E-chip for radio receivers in general, and car radios specifically, would be a more effective upgrade than ERDS if an incremental receiver cost is to be born by consumers.

## XI. Mexican and Canadian Considerations

22. An issue not addressed in the Federal Signal petition is the impact of ERDS stations to Mexican and Canadian FM stations, and treaty implications. Even if the Commission decides it can address these problems by establishing a keep-away zone within a specified

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[5] These nine categories are Police, Fire, EMS (*e.g.*, ambulances), Children (*e.g.*, school buses), Train, Construction, Traffic, Storm, and Evacuate (chemical plant emergency).

distance of the Mexican or Canadian borders, how would this be enforced for the large number of mobile transmitters in public safety vehicles that the Petition envisions? SBE believes that the answer would be that a keep-away zone would be impossible to enforce, meaning that Mexican and Canadian concurrence, and likely formal modifications to the U.S.-Mexico and U.S.-Canada FM Broadcast Agreements, would be required.

## XII. Summary

23. For all of these reasons, SBE believes that ERDS as proposed in the Federal Signal Petition for Rulemaking is a bad idea, and should not be pursued further.

## List of Figures

24. The following figures or exhibits have been prepared as a part of these RM-9719 comments:

1. Map showing WA2NXN authorized area of operation
2. Reproduction of Figure 1 from Section 73.599 of the FCC Rules, with extrapolated Channel 200 curve.

Respectfully submitted,

Society of Broadcast Engineers, Inc.

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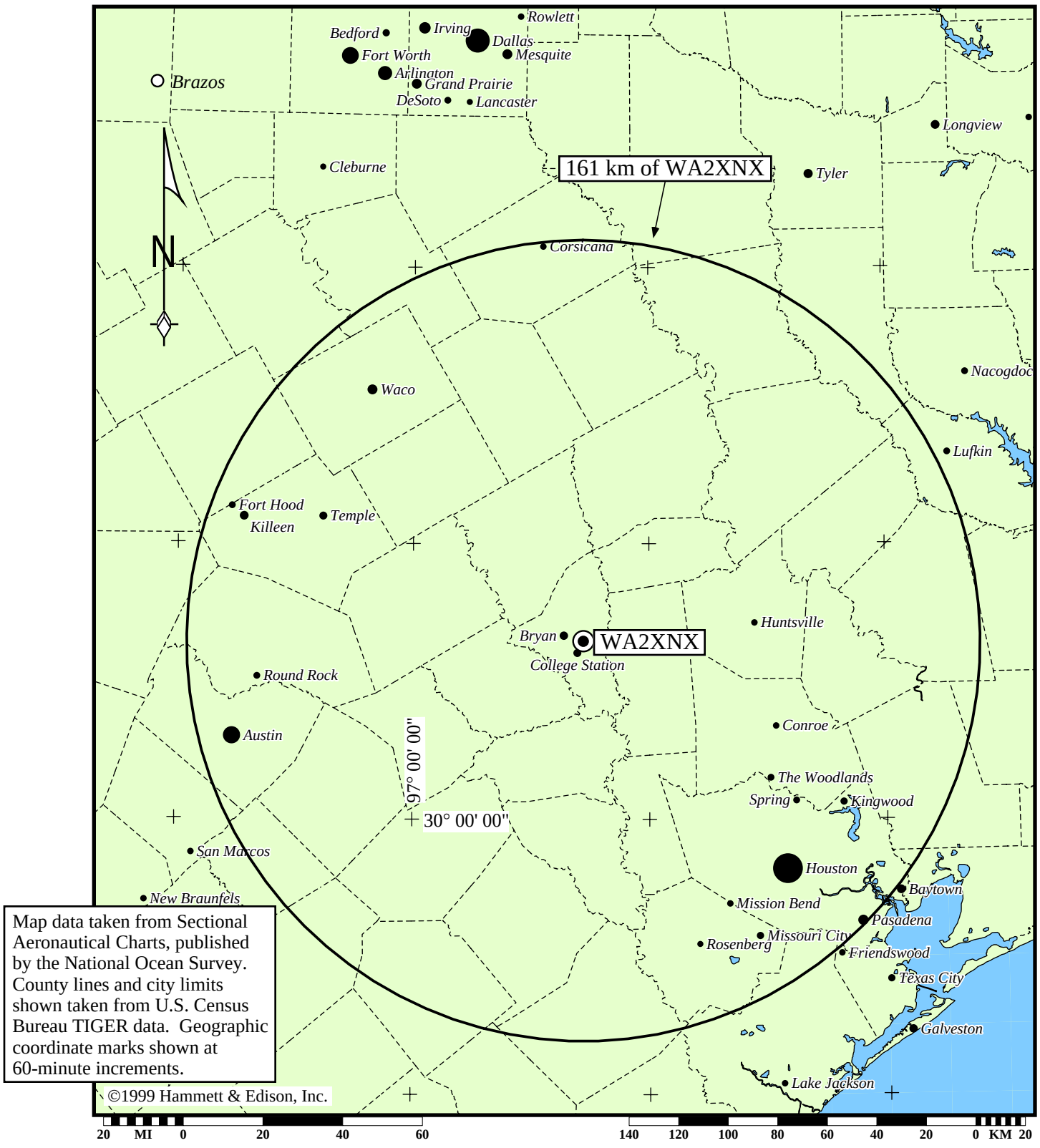
## SBE Comments: RM-9719 (ERDS on 87.9 MHz)

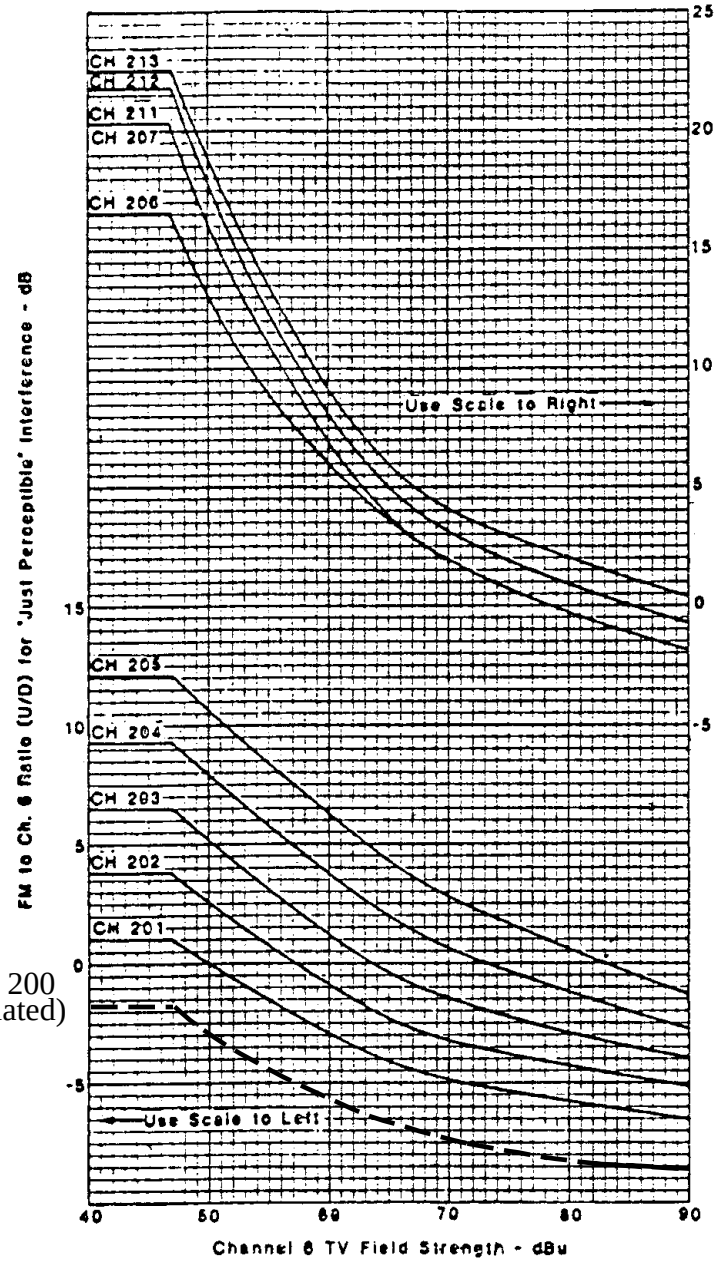
## WA2XNX Area of Operation




Map data taken from Sectional Aeronautical Charts, published by the National Ocean Survey. County lines and city limits shown taken from U.S. Census Bureau TIGER data. Geographic coordinate marks shown at 60-minute increments.

## SBE Comments: RM-9719 (ERDS on 87.9 MHz)

## Section 73.599, Figure 1, with Extrapolated Channel 200 Curve




Channel 200
(Extrapolated)

Figure 1
FM/TV 6 PROTECTION RATIOS
BASED ON MEDIAN RECEIVERS
CHANNELS 201-213